IT24101605
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PS Lab Sheet 08

Exercise

1. Calculate the population mean and population standard deviation of the laptop bag weights.

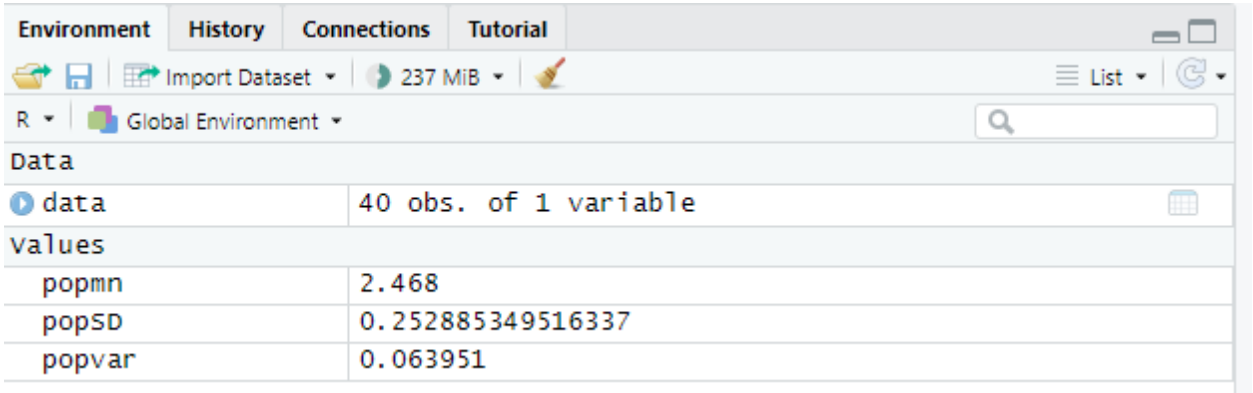
```
setwd("C:\\Users\\it24101605\\Desktop\\IT24101605_Lab_08")

data <- read.table("Exercise - LaptopsWeights.txt", header=TRUE)
fix(data)
attach(data)

## Question 01
popmn <- mean(weight.kg.)
popvar <- var(weight.kg.) * (length(weight.kg.)-1)/length(weight.kg.)
popSD <- sqrt(popvar)

popmn
popvar
popSD
```

```
>
> ## Question 01
> popmn <- mean(Weight)
> popvar <- var(Weight) * (length(Weight)-1)/length(Weight)
> popSD <- sqrt(popvar)
>
> popmn
[1] 2.468
> popvar
[1] 0.063951
> popSD
[1] 0.2528853
```



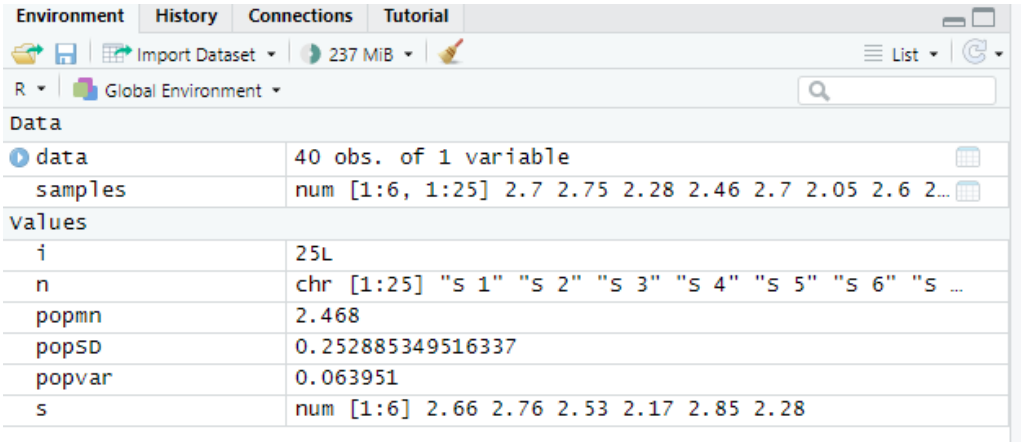
2. Draw 25 random samples of size 6 (with replacement) and calculate the sample mean and sample standard deviation for each sample.

```
## Question 02
samples <- c()
n <- c()
for (i in 1:25){
  s <- sample(Weight, 6, replace=TRUE)
  samples <- cbind(samples, s)
  n <- c(n,paste('S',i))
}
colnames(samples) <- n

s.means <- apply(samples, 2, mean)
s.var   <- apply(samples, 2, var)
s.SD    <- sqrt(s.var)

s.means
s.SD
```

```
> ## Question 02
> samples <- c()
> n <- c()
> for (i in 1:25){
+   s <- sample(Weight, 6, replace=TRUE)
+   samples <- cbind(samples, s)
+   n <- c(n,paste('S',i))
+ }
> colnames(samples) <- n
>
> s.means <- apply(samples, 2, mean)
> s.var   <- apply(samples, 2, var)
> s.SD    <- sqrt(s.var)
>
> s.means
    S 1     S 2     S 3     S 4     S 5     S 6     S 7     S 8     S 9    S 10    S 11    S 12
2.485000 2.390000 2.466667 2.523333 2.653333 2.413333 2.546667 2.483333 2.506667 2.533333 2.541667 2.471667
   S 13    S 14    S 15    S 16    S 17    S 18    S 19    S 20    S 21    S 22    S 23    S 24
2.656667 2.393333 2.533333 2.298333 2.550000 2.548333 2.566667 2.391667 2.541667 2.380000 2.396667 2.468333
   S 25
2.395000
> s.SD
      S 1       S 2       S 3       S 4       S 5       S 6       S 7       S 8       S 9      S 10
0.25618353 0.21484878 0.18359375 0.22888134 0.15187714 0.17258814 0.16741167 0.20636537 0.21172309 0.20490648
     S 11      S 12      S 13      S 14      S 15      S 16      S 17      S 18      S 19      S 20
0.24943269 0.43406989 0.15121728 0.29857439 0.25889509 0.37037369 0.15899686 0.08109665 0.15526322 0.39458417
     S 21      S 22      S 23      S 24      S 25
0.27614610 0.26168684 0.22482586 0.31789411 0.34616470
```

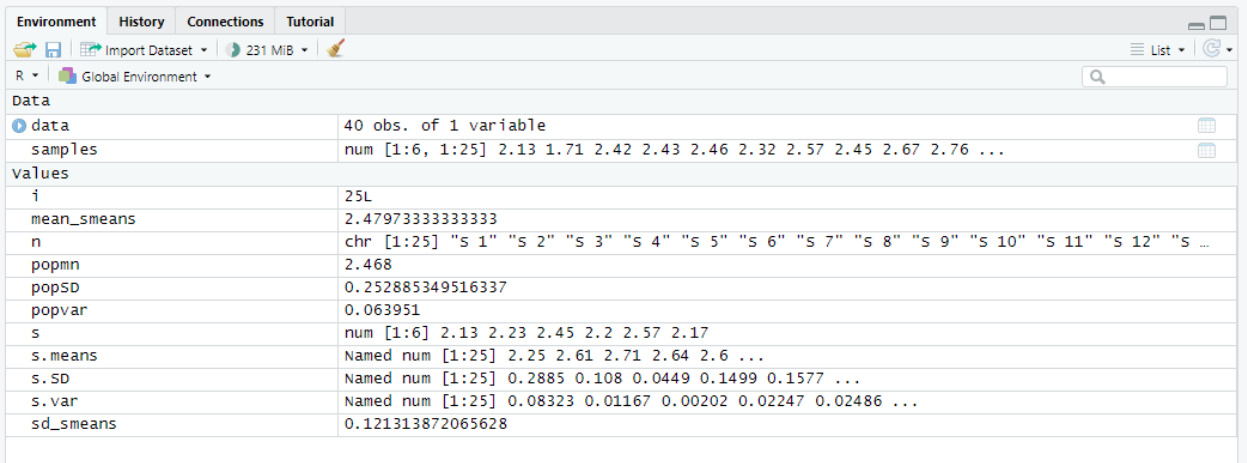


3. Calculate the mean and standard deviation of the 25 sample means and state the relationship of them with true mean and true standard deviation.

```
## Question 03
mean_smeans <- mean(s.means)
sd_smeans   <- sd(s.means)

mean_smeans
sd_smeans
```

```
> ## Question 03
> mean_smeans <- mean(s.means)
> sd_smeans   <- sd(s.means)
>
> mean_smeans
[1] 2.4854
> sd_smeans
[1] 0.08741303
```



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Import Dataset | 231 MiB | List

R | Global Environment

Data	
data	40 obs. of 1 variable
samples	num [1:6, 1:25] 2.13 1.71 2.42 2.43 2.46 2.32 2.57 2.45 2.67 2.76 ...
Values	
i	25L
mean_smeans	2.47973333333333
n	chr [1:25] "s 1" "s 2" "s 3" "s 4" "s 5" "s 6" "s 7" "s 8" "s 9" "s 10" "s 11" "s 12" "s …
popmn	2.468
popSD	0.252885349516337
popvar	0.063951
s	num [1:6] 2.13 2.23 2.45 2.2 2.57 2.17
s.means	Named num [1:25] 2.25 2.61 2.71 2.64 2.6 ...
s.SD	Named num [1:25] 0.2885 0.108 0.0449 0.1499 0.1577 ...
s.var	Named num [1:25] 0.08323 0.01167 0.00202 0.02247 0.02486 ...
sd_smeans	0.121313872065628